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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/601,255	06/19/2003	Deborah L. Mowery-Evans	SD7275/S100325	6697

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EXAMINER

STRICKLAND, JONAS N

ART UNIT	PAPER NUMBER
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1754

DATE MAILED: 06/02/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b> 10/601,255	<b>Applicant(s)</b> MOWERY-EVANS ET AL.	
	<b>Examiner</b> Jonas N. Strickland	<b>Art Unit</b> 1754	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 19 June 2003.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-17 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-17 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 19 June 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)  | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>6/2003</u> . | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### *Claim Rejections - 35 USC § 102*

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1, 2, 7, 9-12, and 14 are rejected under 35 U.S.C. 102(b) as being anticipated by Smirniotis et al. ("Low Temperature Selective Catalytic Reduction of NO with NH<sub>3</sub>..").

Applicant claims a method for catalytically reducing nitrogen oxide compounds, comprising exposing a gas comprising nitrogen oxides, consisting of NO and NO<sub>2</sub>, in the presence of NH<sub>3</sub> to a catalyst comprising an active component selected from CuO, Mn, and oxides of Mn on a hydrous metal oxide support.

Smirniotis et al. discloses a process for treating nitrogen oxides by using a hydrous metal oxide support, such as Hombikat TiO<sub>2</sub> for NO reduction to produce a 100% yield of nitrogen gas (p. 2480, col. 1). Smirniotis et al. continues to disclose wherein the active component comprises Mn (p. 2480, col. 2). Smirniotis et al. continues to disclose wherein it is known in the art to use mixed metal oxide catalysts such as MoO<sub>3</sub>, CuO, and MnO<sub>x</sub> supported on TiO<sub>2</sub> are useful in SCR processes for reducing nitrogen oxides (p. 2480, col. 1). The gas may also comprise oxygen and water vapor (p. 2481, col. 1). The reduction of nitrogen oxides occurs at 180°C (see

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page 2481, col. 1). The conversion to nitrogen is 100% (see Table 1, Example 3). The oxides of Mn are comprised of  $MnO_2$  (see Table 1, example 3).

***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

5. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

6. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Smirniotis et al. ("Low Temperature Selective Catalytic Reduction of NO with  $\text{NH}_3$ ..") in view of Dosch et al. (US Patent 5,461,022).

Applicant claims with respect to claim 3, wherein the promoter concentration is less than approximately 5% by weight of the catalyst.

The teachings of Smirniotis et al. have been discussed with respect to claims 1, 2, 7, 9-12, and 14. However, the reference is silent in regards to the concentration of the promoter.

Dosch et al. teaches thin film hydrous metal oxide catalysts. Dosch et al. continues to teach wherein these catalysts are useful for the reduction of nitrogen oxides (col. 2, lines 53-54). The metal oxide is preferably titanium (col. 3, lines 22-40). Dosch et al. teaches having Mo as a promoter for the catalyst and loading 1% of Mo onto the hydrous titanium oxide catalyst (col. 3, lines 45-50 and col. 8, line 15).

Therefore, it would have been obvious to one of ordinary skill in the art to modify the teachings of Smirniotis, based on the teachings of Dosch et al., by having a promoter concentration less than 5% by weight of the catalyst, since Dosch et al. teaches having 1% by weight of Mo as a promoter on a hydrous titanium oxide catalyst useful for treating nitrogen oxides and wherein Smirniotis et al. teaches using Mo as a promoter on a titanium oxide catalyst used in reducing nitrogen oxides. Such modification would have been obvious to one of ordinary skill in the art, because one of ordinary skill in the art would have expected a process for reducing nitrogen oxides using a hydrous titanium metal oxide as taught by Dosch et al having a Mo promoter to

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be similarly useful and applicable to a process for treating nitrogen oxides using a hydrous titanium metal oxide catalyst and having a Mo promoter as taught by Smirniotis et al.

7. Claims 4, 5, and 15-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Smirniotis et al. ("Low Temperature Selective Catalytic Reduction of NO with NH<sub>3</sub>..") in view of Gardner et al. (US Patent 6,165,934).

Applicant claims wherein the catalyst comprises silica and wherein the amount of silica stabilizes the catalyst for temperatures up to 1000°C.

The teachings of Smirniotis et al. have been discussed with respect to claims 1, 2, 7, 9-12, and 14. However, the reference is silent in regards to the catalyst comprising silica and wherein the amount of silica stabilizes the catalyst for temperatures up to 1000°C.

Gardner et al. teaches a material and system for the catalytic reduction of nitrogen oxides in an exhaust gas stream wherein the catalyst is comprised of hydrous titanium oxide with a copper promoter compound (see abstract). Gardner et al. continues to teach wherein the catalyst includes silica, which allows the catalyst to be stabilized for temperatures up to 1000°C. Gardner et al. also teaches wherein the catalyst system is applied to a ceramic substrate, such as beads or a monolith, such as a cordierite honeycomb monolith (col. 1, lines 48-56).

Therefore, it would have been obvious to one of ordinary skill in the art to modify the teachings of Smirniotis et al. by adding a silica material, as taught by Gardner et al., since Gardner et al. teaches wherein silica stabilizes a hydrous titanium oxide with a

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copper promoter compound at temperatures up to 1000°C. Such modification would have been obvious to one of ordinary skill in the art, because one of ordinary skill in the art would have expected a process for treating nitrogen oxides using a hydrous titanium oxide catalyst as taught by Gardner et al. to be similarly useful and applicable to a hydrous titanium oxide catalyst which also is used to reduce nitrogen oxides as taught by Smirniotis et al.

8. Claims 6, 8 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Smirniotis et al. ("Low Temperature Selective Catalytic Reduction of NO with NH<sub>3</sub>..") in view of Gardner et al. (Ammonia/Urea Selective Catalytic Reduction for Mobile Diesel Engines).

Applicant claims wherein the nitrogen oxides have a concentration less than 1000 ppm and wherein the presence of ammonia occurs from the thermal decomposition of urea.

The teachings of Smirniotis et al. have been discussed with respect to claims 1, 2, 7, 9-12, and 14. However, the reference is silent in regards to wherein the nitrogen oxides have a concentration less than 1000 ppm and wherein the presence of ammonia occurs from the thermal decomposition of urea. Smirniotis et al. discloses wherein the levels of nitrogen oxides are 2000 ppm (p. 2481, col. 1).

However, Gardner et al. teaches wherein the nitrogen oxide concentration may be 175 ppm (see Table 1) and wherein ammonia is produced from urea decomposition (see col. 3). Gardner also teaches wherein the concentration of nitrogen oxides and ammonia are the same (see Figure 3).

Therefore, it would have been obvious to one of ordinary skill in the art to modify the teachings of Smirniotis et al. based on the teachings of Gardner et al., by having a nitrogen oxide concentration in the range below 1000 ppm and wherein ammonia is produced from urea decomposition, since Gardner et al. teaches wherein the nitrogen oxide concentration may be 175 ppm (see Table 1) and wherein ammonia is produced from urea decomposition. Such modification would have been obvious to one of ordinary skill in the art, because one of ordinary skill in the art would have expected a process for treating nitrogen oxides using a SCR process as taught by both Smirniotis et al. and Gardner et al., which also uses a hydrous titanium oxide catalyst to be similarly useful and applicable in the art of reducing nitrogen oxides.

### ***Conclusion***

9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure (USP 4735927); USP 5409681; USP 5795553; USP 5,830,421.

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jonas N. Strickland whose telephone number is 571-272-1359. The examiner can normally be reached on M-TH, 7:30-5:00, off 1st Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stanley Silverman can be reached on 571-272-1358. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.



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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Jonas N. Strickland  
May 27, 2004